

WHAT IS CLAIMED IS (US) :

1. An optical data recording medium, in which irradiation of a light beam is used for recoding or reproducing data, comprising:

a substrate; and

a reproducing layer, provided to face a light-incident surface of the substrate, the reproducing layer for reproduction of a signal from a mark having a mark length shorter than a resolution limit of an optical system of a reproducing apparatus for reproducing the optical data recording medium.

2. The optical data recording medium as set forth in Claim 1, said substrate having a rise and/or a recess that contributes recording and/or reproduction on the light incident surface of the substrate,

said optical data recording medium, further comprising:

a functional layer, provided on a light-incident surface of the substrate, the functional layer for assisting the recording and reproducing of data, and,

said reproducing layer being provided on a surface of the functional layer, and having a transmittance that changes in accordance with a light intensity distribution of the light beam.

3. The optical data recording medium as set forth in Claim 1, wherein:

the reproducing layer is made of a material whose transmittance changes in accordance with to temperature.

4. The optical data recording medium as set forth in Claim 1 wherein:

at least a part of that surface of the reproducing layer to which the light beam is irradiated is exposed to air.

5. The optical data recording medium as set forth in Claim 1 wherein:

the functional layer is a light absorption layer for converting the light beam to heat, the light absorption layer being contiguous to the reproducing layer.

6. The optical data recording medium as set forth in Claim 1 wherein:

the functional layer is a reflective layer for reflecting the light beam, the reflective layer being provided between the substrate and the reproducing layer.

7. The optical data recording medium as set forth

in Claim 1 wherein:

the reproducing layer is made of a metal oxide.

8. The optical data recording medium as set forth in Claim 7, wherein:

the reproducing layer is made of a zinc oxide.

9. The optical data recording medium as set forth in Claim 5, wherein:

the light absorption layer is made of one of silicon, germanium and an alloy of silicon and germanium.

10. An optical data recording medium, in which irradiation of a light beam is used for recoding and/or reproducing data, comprising:

a substrate having a non-flat surface on which a rise and/or a recess for recording and/or reproduction is formed;

a reproducing layer, provided on the non-flat surface of the substrate, the reproducing layer having a changeable transmittance with respect to the light beam, the changeable transmittance being changeable in accordance with intensity distribution of the light beam irradiated on the reproducing layer; and

a reflective surface, provided between the substrate

and the reproducing layer, for reflecting a light beam having passed through the reproducing layer, the reflective surface having a rise and/or a recess that corresponds to the rise and/or the recess of the substrate.

11. The optical data recording medium as set forth in Claim 10, further comprising:

a reflective layer provided between the substrate and the reproducing layer, and including the reflective surface.

12. The optical data recording medium as set forth in Claim 10, further comprising:

a light absorption layer, provided between the substrate and the reproducing layer, for converting, to heat, the light beam irradiated thereon.

13. The optical data recording medium as set forth in Claim 10, wherein:

at least a part of that surface of the reproducing layer which is a reverse surface to the surface facing the substrate is exposed to air.

14. The optical data recording medium as set forth in Claim 10, wherein:

the rise or the recess is formed by a guiding groove that is for guiding the light beam.

15. The optical data recording medium as set forth in Claim 10, wherein:

the rise or the recess is formed by a pit that is indicative of recorded data.

16. The optical data recording medium as set forth in Claim 10, wherein:

the rise or the recess is (i) formed by a guiding groove that is for guiding the light beam and (ii) a pit that is indicative of recorded data.

17. A reproducing method of an optical data recording medium in which irradiation of a light beam is used for reproducing data recorded in the optical recording medium,

said optical data recording medium, including:

a substrate; and

a reproducing layer, provided to face a light-incident surface of the substrate, the reproducing layer for reproduction of a signal from a mark having a mark length shorter than a resolution limit of an optical system of a reproducing apparatus for the optical data recording

medium,

said reproducing method comprising the steps of:

irradiating the light beam from above the reproducing layer; and

reproducing the mark having a mark length shorter than resolution limit of the optical system of the reproducing apparatus.

18. A reproducing method of an optical recording medium in which irradiation of a light beam is used for reproducing data recorded in the optical recording medium,

said optical recording medium including:

a substrate having a non-flat surface on which a rise and/or a recess for recording and/or reproduction is formed;

a reproducing layer, provided on the non-flat surface of the substrate, the reproducing layer having a changeable transmittance with respect to the light beam, the changeable transmittance being changeable in accordance with intensity distribution of the light beam; and

a reflective surface, provided between the substrate and the reproducing layer, for reflecting a light beam having passed through the reproducing layer, the

reflective surface having a rise and/or a recess that corresponds to the rise and/or the recess of the substrate,

said reproducing method comprising the step of:

reproducing recording data by irradiating a light beam the optical data recording medium from above the reproducing layer.